

RESEARCH

# Get that into your head: Tigre vowel harmonies as templatic

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This article argues that vocalic expressions are templatic: they have a head position and a dependent position. It follows that the same element can appear in both positions. The proposal is discussed and illustrated through an analysis of two types of harmony in the Ethio-Semitic language Tigre: lowering harmony and rounding harmony. Building on the original account of lowering harmony in Lowenstamm & Prunet (1988), and presenting for the first time collected data from the Səmhər dialect, it is argued that harmony can be construed as the fusion of the head or “Target” positions in the templates of adjacent expressions. It is further shown that syllables, too, can have a “Target” position, which is determined by their onset. Lowering harmony operates on this level as well.

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**Keywords:** Tigre; vowel harmony; syllables; Element Theory; head

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“The Great Roe is a mythological beast with the head of a lion and the body of a lion,  
though not the same lion.”  
– Woody Allen, *Fabulous Tales and Mythical Beasts*

## 1 General introduction

Linguistic entities with more than one identifiable constituent often get analyzed as having internal structure. One of the two constituents is usually judged to be more important or more prominent than the other and accorded “head” status, while the other constituent is the “dependent”. The head-dependent distinction has played a major role in analyses conducted within Element Theory (Kaye et al. 1985; Charette & Göksel 1998; Bäckley 2011): it has been used to explain the shape of consonantal and vocalic systems, various assimilation phenomena (including harmony), vowel reduction etc.

The nature of head status, however, is not fully understood. In a vocalic expression such as [A, I], what makes one of the two elements a head? A possible answer is that universally, the mere existence of two elements implies an asymmetric relation, and therefore one of the two elements *must* be head; which one it will be is a language-specific issue. Bäckley (2011) states that “Language learners probably assign headedness to [a complex expression] anyway, since head-dependency relations are an integral part of element structure” (Bäckley 2011: 46). By a similar rationale, once the expression has only one element, that element is automatically the most prominent in its expression, and therefore must be a head. Again, Bäckley writes “[...] a single element should always be headed because its acoustic pattern entirely dominates the expression” (Bäckley (2011: 42). These two statements put together derive the following principle:

- (1) The headedness principle  
All expressions must be headed

But many other researchers do not adhere to this view. Indeed, in the same book, Backley mentions cases where assuming *unheaded* expressions may be the correct analysis. For instance, English weak vowels [ɪ, ʊ, ə] can be viewed as unheaded |I|, |U|, |A|. But if expressions with nothing but a single element are either headed or unheaded, then it follows that *the head or dependent status of an element is not relational* – that is, an element can be a head without there being a dependent, or a dependent without there being a head.

Kaye (2001) proposes an interesting alternative whereby a vocalic expression “is defined as an ordered *pair*” (my emphasis). If so, expressions containing a single element also contain an empty *position*: that of the head or that of the non-head, depending on the status of the single element. There is thus always a relation, even if one (or both) of the participants is an empty position. Importantly, Kaye’s proposal effectively divorces the head/dependent *positions* from the element that occupies them. In other words, the head/dependent structure exists in this model regardless of what, if anything, is inserted into it.

While he does consider the possibility of unheaded expressions, Kaye seems to adopt (1) for all the languages he examines. More importantly for the purpose of this paper, since head vs. dependent are positions and elements are not inherently heads or dependents, it is theoretically possible that in an expression, *an identical element may be inserted in both positions*. Thus, given two positions and one element to be manipulated by the grammar, there are three possibilities: the element will occupy the head position (2a); the element will occupy the dependent position (2b); or the element will occupy both (2c).

- (2) Three possibilities
- |           |                                       |                                       |                                       |
|-----------|---------------------------------------|---------------------------------------|---------------------------------------|
|           | a.                                    | b.                                    | c.                                    |
| Head      | <input checked="" type="checkbox"/> I | <input type="checkbox"/>              | <input checked="" type="checkbox"/> I |
| Dependent | <input type="checkbox"/>              | <input checked="" type="checkbox"/> I | <input checked="" type="checkbox"/> I |

Kaye assumes that (2c) is impossible (cf. the third clause in his definition of vocalic expressions; Kaye 2001: 255), but does not motivate this assumption. Indeed, there is nothing inherent to the model to rule out (2c). In this paper, I will make the following claims:

- (3) Claims
- a. All vocalic expressions in all languages have head and dependent *positions*; as a consequence:
  - b. The same element may occupy the head and dependent positions.

I will discuss one phenomenon that nicely illustrates the veracity of the claims in (3): Tigre vowel harmony, whereby the short low vowel of the system becomes lower before the long low vowel. The data will be presented in section 2. In section 3 I will discuss

a previous analysis and how an analysis that accepts (3) fares better than the previous analysis.

## 2 Tigre Lowness Harmony

Tigre (Raz 1980, 1983) displays the six vowel system that most Ethio-Semitic languages do. In Tigre, it consists of five phonetically-stable vowels [i, u, e, o, a], and one phonetically-unstable one, of generally low quality, realized as [ə, ɛ, ʌ, a] depending on the context. Stable vowels are generally pronounced long; the unstable vowel is always short. In addition, the (short) vowel [i] serves as the epenthetic vowel of the system (for more on the epenthetic vowel, see footnote 3).

The consonantal system of the language is typical of a Semitic language. Alongside a set of relatively unmarked consonants with some asymmetries [b, m, f, t/d, s/z, ʃ, ʒ, n, r, l, k/g, h, ʔ, w, j], there are also two pharyngeal consonants [ħ, ʕ] and four ejectives [tʔ, kʔ, tsʔ, tʃʔ].

The quality of the unstable lexical vowel is determined in the following way. First, as noted by Palmer (1956), the quality of that vowel is [a], rather than one of the higher qualities, if one of three conditions holds:

- (4) Conditions for the [a] realization of the short low vowel
- i. A stable vowel [a:] follows anywhere in the word, and no other stable vowel interferes.
  - ii. The onset of its syllable is an ejective [tʔ, kʔ, tsʔ, tʃʔ] or a pharyngeal [ħ, ʕ] consonant.
  - iii. One of these consonants follows anywhere in the word.

Like Palmer, most researchers focused on the Mansaʕ dialect. I in turn worked with a speaker of the Səmhər dialect. In this dialect, unlike in those reported in previous studies, a final low vowel is always pronounced as [a] *and* triggers harmony; the realizations [ə, ɛ, ʌ] are banned from this position. I conclude that at least for this dialect, there is a typologically unsurprising restriction to phonologically-long vowels at the right edge of the word. Phonetically, the underlying length of this vowel is reduced.

Because of this fact, the perfective paradigms in (5) can be used to illustrate the three conditions above. All three verbs in (5) are of the same “template”, which for our purpose implies that they all have the same stem, with the same underlying vocalization consisting of two short, low vowels, e.g. [kətəb-ko] ‘I wrote’. The second of the two vowels syncopates before vowel-initial suffixes, e.g. [kətəb-əw] ‘they wrote’. The paradigm in (5a) illustrates condition (i): the stem vowels are realized as [ə] unless the form ends in a low vowel, which must be [a], in which case the stem vowels are also realized as [a]. In (5b) condition (ii) is at work: the vowel immediately following the ejective [tʔ] is realized [a], but this does not influence the following vowel, which still follows condition (i). Finally, the paradigm in (5c) illustrates condition (iii), with both vowels being realized as [a] throughout the paradigm, regardless of the vowel of the suffix, because the final stem consonant is an ejective.<sup>1</sup>

<sup>1</sup> All of the data in this paper comes from work with a single speaker of the Səmhər dialect aged 22. All words were elicited in isolation, and the lowering effects were all verified in phonetic analysis.

## (5) Tigre Vowel Harmonies I: progressive/regressive lowness, V/C induced.

	a. 'write'	b. 'order in restaurant'	c. 'slip' <sup>2</sup>
1 SG	kətəb-ko	t <sup>2</sup> aləb-ko	malatʃ <sup>2</sup> -ko
PL	katab-na	t <sup>2</sup> alab-na	malatʃ <sup>2</sup> -na
2 MSG	katab-ka	t <sup>2</sup> alab-ka	malatʃ <sup>2</sup> -ka
FMSG	kətəb-ki	t <sup>2</sup> aləb-ki	malatʃ <sup>2</sup> -ki
MPL	kətəb-kom	t <sup>2</sup> aləb-kom	malatʃ <sup>2</sup> -kom
FMPL	kətəb-kin	t <sup>2</sup> aləb-kin	malatʃ <sup>2</sup> -kin
3 MSG	katba	t <sup>2</sup> alba	malʃ <sup>2</sup> a
FMSG	kətb-ət	t <sup>2</sup> alb-ət	malʃ <sup>2</sup> -at
MPL	kətb-əw	t <sup>2</sup> alb-əw	malʃ <sup>2</sup> -aw
FMPL	katb-aya	t <sup>2</sup> alb-aya	malʃ <sup>2</sup> -aya

This process, which I will call harmony in lowness, is therefore not a uniform process: it spreads from the onset rightwards only to the adjacent vowel, and from consonants and vowels leftwards unboundedly. Very intriguingly, vowel-induced harmony and consonant-induced harmony are also different. For consonant-induced harmony, intervening stable vowels are transparent (6a; note that the vowel cannot be the stable /a/, or it would be pronounced long, \*[a:rit<sup>2</sup>]). For vowel-induced harmony, lexical vowels block harmony (6b).

## (6) Blocking harmony in lowness

a.	sandu:k <sup>2</sup>	'box'	b.	səmbu:ka	'her boat'
	ʃari:t <sup>2</sup>	'ribbon'		dəbe:la	'he-goat'
	ʃarmu:t <sup>2</sup>	'prostitute (male)'		təko:bata	'her mat'

An attempt to account for these harmony patterns was undertaken in Lowenstamm and Prunet (1988). While the claims in (3) are made here for the first time, much of Lowenstamm and Prunet's original insights will be adopted in the present analysis. The similarities and differences will be returned to below.

To complicate matters, Tigre exhibits (probably under the influence of Tigrinya) an additional, optional process of harmony in *rounding*. It is reported here for the first time, based on my own fieldwork. Before a round vowel or glide, the unstable low vowel may – but does not have to – be rounded into [o] (7a). This regressive harmony does not affect vowels whose onset is a lowering consonant (7b), and is blocked by lowering consonants anywhere in its path (7c). If so, when the vowel can be both lowered and rounded, it will be lowered but not rounded.

<sup>2</sup> This verb has the meaning 'slip away' or 'manage to avoid' when it has an animate subject, and simply 'fall' when the subject is inanimate. It will be glossed 'slip' in this paper.

## (7) Tigre Vowel Harmonies II: optional regressive rounding, V-induced

	a. ‘write’	b. ‘order in restaurant’	c. ‘grow bald’
1 SG	kətəb-ko ~ kətobko, kotobko	tʰaləb-ko ~ tʰalob-ko, *tʰolob-ko	malatʃʰ-ko *molotʃʰ-ko, *malotʃʰ-ko
2 MPL	kətəb-kom ~ kətobkom kotobkom	tʰaləb-kom ~ tʰalob-kom, *tʰolob-kom	malatʃʰ-kom *molotʃʰ-kom, *malotʃʰ-kom
3 MPL	kətəb-əw ~ kətəbow, kotəbow	tʰalb-əw ~ tʰalb-ow, *tʰolb-ow	malʃʰ-aw *molʃʰ-ow, *malʃʰ-ow

Let us call this harmony “regressive harmony in rounding”. As far as I was able to tell, with the exception of the final glide, there is no consonant-induced harmony in rounding in either direction.

Several questions are raised by the Tigre data. We will concentrate on four:<sup>3</sup>

Q1. Why is the short low vowel the only undergoer of harmony?

Q2. How do stable vowels block vowel-induced harmony in lowness?

Q3. How do pharyngeal and ejective consonants block regressive harmony in rounding?

Q4: Why is vowel-induced harmony blocked by stable vowels, but consonant-induced harmony isn’t?

Answers will be provided in the following section.

### 3 Analysis

#### 3.1 The vowel system of Tigre and the headed/headless distinction

A structural description of the vocalic system of Tigre calls for the head-dependent distinction independently of the harmony data. Recall that Tigre has two low vowels: a short unstable one, and a long, stable one. There are two ways to derive the existence of these two vowels:

(8) Two ways to derive two low vowels

a. One of the two low vowels is realized lower because it is long.

b. One of the two low vowels is realized as long because it is lower.

If (8a) were correct and lowness were a correlate of length, we would not expect a short vowel to be realized as low under harmony while remaining short. But we have seen in (5) above that the vowels of the verbal stem were *always* short, regardless of their quality, and even in open syllables. In contrast, if underlying quality is what determines length, as in (8b), then the fact that one can have short [a] is not surprising: it only shows that that the vowel is not underlyingly /a/. One must conclude in favor of (8b).

<sup>3</sup> The interaction of the harmonic phenomena with epenthesis vowels is not discussed in this paper, as the issue here is not the representation of empty nuclei but headedness in vocalic expressions. The facts, which have hitherto not been stated clearly in the literature, are the following. Consonant-induced harmony is not blocked by epenthetic [i], e.g. [warih] ‘month’, [mallitʃʰ] ‘slip.IMPFV’. Vowel-induced harmony in Lowness is blocked by epenthesis [tərgima] ‘translate.FPL.IMP’. Rounding harmony applies to the epenthetic vowel, optionally transforming it into [u] before round vowels: [hitu]~[hutu] ‘he’. As in the case of the short /ə/, once harmony applies to an epenthetic position it can continue its spread: [tərgimu]~[tərgumu]~[tərgumu] ‘translate.MPL.IMP’.

Following this logic, Faust (2014) formalizes the proposal made in Lowenstamm & Prunet (1988) by devising the licensing constraint in (9a) (heads underlined; for licensing constraints, see Charette & Göksel 1998; Kaye 2001). This constraint makes sure that there is only one way to combine |I| or |U| and |A|, and so only two mid vowels; it also underlies the impossibility of the combination |I, U|. In other words, this constraint alone derives the six vowel system in (9b). In order to cover phonological length, (9c) is proposed.

- (9) Licensing constraints for the Tigre vowel system
- a. I and U are always heads.
  - b. |A|, |A|, |I|, |U|, |IA|, |UA|
  - c. Headed expressions must branch.

Thus, headed expressions are always phonologically long. There are two differences between Mansaʕ dialect as it is reported in the literature and the Səmhər that I encountered: 1) Mansaʕ has closed syllable shortening ([gɛ:da-gədko] ‘he/I hurried’), Səmhər doesn’t ([gɛ:sa-gɛ:sko] ‘he/I went’), and 2) Səmhər disallows final phonologically-short vowels, as mentioned above, and so has [katba] ‘he wrote’, whereas the form reported for Mansaʕ is [kətə]. I assume that the lack of length of Səmhər [a] in the final position is a phonetic effect: as can be seen in the last two examples, the vowel always triggers harmony in Səmhər, but not in Mansaʕ.

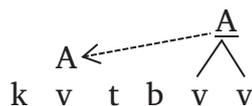
The formalization of the system given in (9) is not only elegant (two statements suffice) but also provides a correlate for headedness in the potential of an expression to undergo harmony. In the previous section, Q1 asked why the short low vowel was the only under-goer of harmony. With this new formalization one can claim that the short low vowel is the only lexically-headless vowel. The headed/headless distinction thus correlates with a trigger-undergoer distinction. This distinction is further corroborated by the harmony in rounding in (7) above: once again, vowels that the system designates as headed – [u] and [o] – trigger harmony on a vowel that is headless. The next section elaborates on the issue of harmony in Tigre.

### 3.2 Harmony in Tigre

#### 3.2.1 Lowenstamm and Prunet (1988)

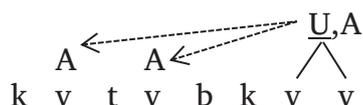
The representation in (10) replicates graphically the analysis of the Tigre facts in Lowenstamm & Prunet (1988) (leaving aside irrelevant aspects such as the difference between vowel and consonant induced harmony). The head A of a trigger spreads leftwards to become the head of a target, which has a non-head A (the dotted line; the spreading process is not elaborated upon in the original paper):

- (10) Harmony in Lowness in Lowenstamm & Prunet (1988)



We have seen in section 2 that there is also an optional process of regressive harmony in rounding, through which /kətəbko/ is realized as [kotəbko]. Adopting the logic in (10), we would devise an analysis such as in (11), whereby again the head of a headed element spreads leftwards to become the head of the target:

(11) Harmony in rounding by analogy to Lowenstamm & Prunet (1988)



The parallel between the two structural descriptions sheds light on the problematic nature of the analysis. If (11) yields a perfectly acceptable vocalic expression with a head |U| and a dependent |A|, then one is obliged to say that the same thing happens in (10): the result is an expression with a head |A| and an identical dependent |A|. However, as we saw in the introductory discussion, such expressions are not even considered possible in previous discussions; this assumption is implicit in Lowenstamm & Prunet (1988), too.

Still, as we further inferred in that discussion, the notion of the vocalic expression in Kaye (2001) is templatic, and there are always *two positions* in the expression; *which* elements will fill the positions is an independent issue, and there is nothing inherent to the proposal to rule out having the same element in both positions. To clarify the proposal, I put forth the universal template for vocalic expressions in (12).

(12) The form of vocalic expressions



The templatic representation of vocalic expressions is reminiscent of the proposals in Harris (1994) and Backley & Takahashi (1996), two papers which also deal with harmony. However, these authors do not associate the positions with head or dependent status, but rather with the tiers of the original Kaye et al. (1985) proposal.

I would further like to refine the notion of head and dependent as templatic with a metaphor that seems more precise than “head” and “dependent”. The dependent of an expression is its melodic *base*, whereas its head is the acoustic *target* of the expression. An element in the *base* position alters the default acoustics of the vowel, whereas the same element in the *target* pulls the expression as much as possible towards its own acoustics. To illustrate, for Tigre, the default acoustics is the central [i], but if the expression has an element |A| in the *base* position, the default is lowered to central [ə]. And if there is another |A| in the head position, the expression will go all the way to the lower [a]. Crucially, again, nothing in the model excludes having |A| in both positions.<sup>4</sup>

3.2.2 Vowel-induced harmony

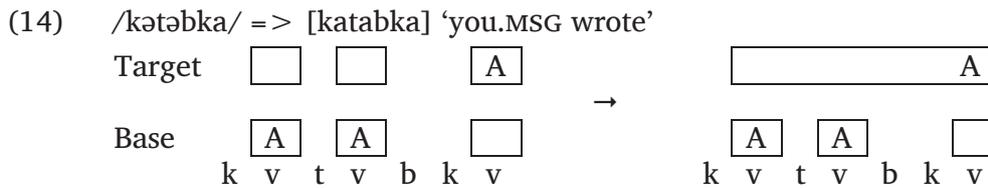
In order to describe the regressive harmony in lowness found in Tigre, I propose the following generalizations:

<sup>4</sup> A reviewer points out that the expressive power of the theory is increased by allowing the same element in the head and dependent position. Given a single element and the universal template, the element can be (i) a dependent/base; (ii) a head/target; and (iii) both. Note, however, that if a target indeed pulls that expression as much as possible towards its own acoustics, it is possible to envisage no phonetic distinction between possibilities (ii) and (iii).

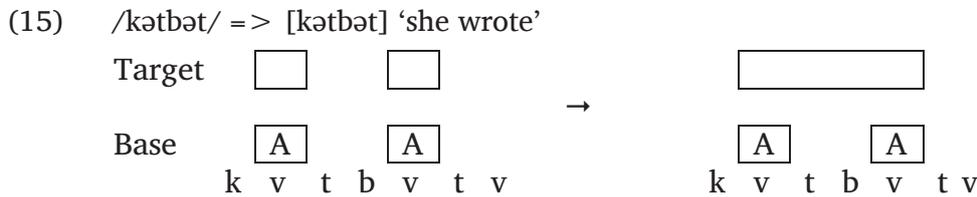
(13) Harmony in Tigre

- a. Expressions seek to have acoustic targets; and therefore
- b. if a vowel contains an acoustic target, all preceding *targetless* expressions will acquire it.<sup>5</sup>

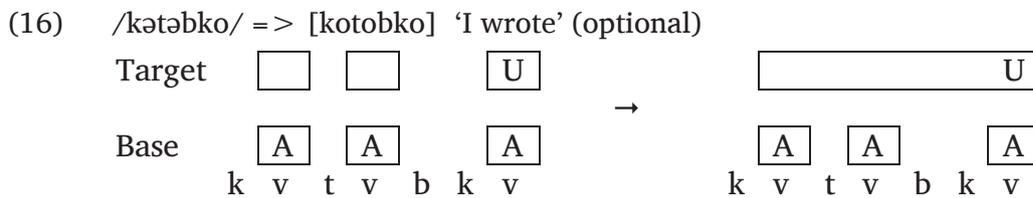
Representationally, one may consider that the target *position* of an expression without a target is fused with that of a following expression with a target. Thus, in (14), the empty target positions of the targetless expressions fuses with that of the final vocalic expression, which is occupied. The element in this position becomes the acoustic target of all three expression and we derive [katabta]:<sup>6</sup>



As we saw, some words simply don’t have acoustic targets, e.g. /kətbət/ ‘she wrote’. In such words the rule applies vacuously, as shown in (15). The target positions of both expressions merge, but since there is no acoustic target in either of the two expressions, both remain without an acoustic target. The presence of |A| only in the base position results in two [ə] vowels (I henceforth consider without discussion that final consonants are onsets; see Harris & Gussmann 1998).



As we saw there is also optional regressive harmony in rounding. This process works exactly like regressive harmony in lowness, as shown in (16). At present I have no concrete proposal to formalize the optionality, other than to condition the fusion by the identity of the element in the lexical target position.



<sup>5</sup> The workings of harmony here are reminiscent of head alignment (e.g. Lee & Yoshida 1998 for the element A), the important difference being that headedness here is not a property of the element but of its position in the template.

<sup>6</sup> Following this analysis requires adding |A, A| to the list of expressions in (9b) above. In addition, note that the phonetic realization of this expression is identical to that of |A|, cf. footnote. 4.

Finally, as we saw, the front vowels [i] and [e] never trigger harmony. I assume that for some reason, an |I| target is incompatible with fusion.<sup>7</sup> The correct prediction is nevertheless made that the mere existence of an interfering target between /ə/ and /a/ will block regressive harmony in lowness, because the empty target position of /ə/ will not be able to fuse with that of /a/:

- (17) /dəbe:la/ => [dəbe:la] ‘he-goat’: merger cannot apply
- |        |   |   |   |     |
|--------|---|---|---|-----|
| Target |   | I |   | A   |
| Base   | A | b | A |     |
|        | d | v | v | l v |

In all of the above representations, intervening consonants did not interfere with the spreading of harmony. This is presumably because, unsurprisingly for a Semitic language, consonants and vowels are situated on different tiers in Tigre. This view may nevertheless be challenged by consonant-induced harmony, discussed in the next subsection.

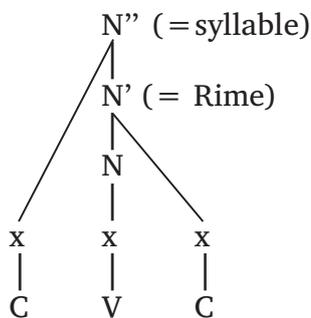
### 3.2.3 Consonant-induced harmony

Two aspects of consonant-induced harmony distinguish it from vowel-induced harmony. First, it may operate rightwards, from an onset to its nucleus but not beyond that, e.g. [tʰaləbko] ‘I ordered (at a restaurant)’. And second, it is not blocked by intervening vowels, e.g. [ʃari:tʰ] ‘ribbon’. In this subsection, we will see that these differences may be explained in a uniform fashion by the following assumptions:

- (18) Assumptions
- a. Syllables have a target slot.
  - b. The acoustic target of a syllable is determined by its onset.
  - c. The acoustic target of a syllable percolates down to its nucleus if the latter does not have a target.

In their analysis of the same facts, Lowenstamm & Prunet’s (1988) propose to anchor the principles in (18) in an X-bar construal of the syllable, as in (19). Principle (18b) specifically would follow from the direct link of the onset to the topmost syllable node.

- (19) The model advocated in Lowenstamm and Prunet (1988)



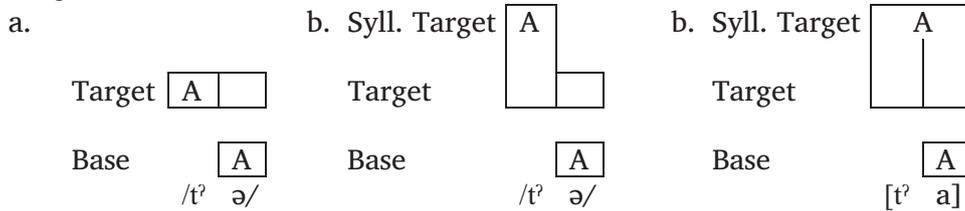
Admittedly, the analysis I will propose here is very similar to Lowenstamm & Prunet’s analysis. Although the formalization here is quite different and no attempt is made to

<sup>7</sup> Because |I| does not trigger harmony, and because there is no [i]–[i] contrast in the language, one might want to state that in Tigre |I| can’t be head. But this leads to a more serious misprediction, namely that |I| should be transparent to rounding or lowering harmony. As (17) shows, it isn’t.

advocate the model in (19), credit is due to the original analysis. Because the part of that paper that developed this analysis remained incomplete, I will not attempt a comparison between the two analyses. The value of the present analysis lies in 1) the incorporation of the Sámhær data and the new phenomenon of rounding; and 2) the reiteration of the necessity of treating target and base as positions, thereby permitting the presence of identical elements in both.

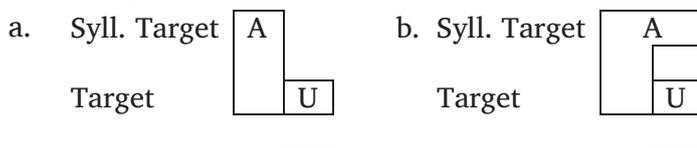
We have seen that low consonants – pharyngeals and ejectives – also trigger lowering. With Lowenstamm & Prunet (1988), I assume that these consonants also have the element |A| in their target position, as in (20a). In the same example, the ejective is followed by /ə/. In this initial representation, there can be no interaction between the two segments, since consonants and vowels are on different tiers. However, as assumed in (18), there is a higher syllabic level whose target is set by that of the consonant, as represented in (20b). Since the syllabic target includes both the consonant and the nucleus, the nucleus will inherit any target set at the syllabic level, as in (20c), where the underlying /ə/ is realized [a].

(20) Target inheritance



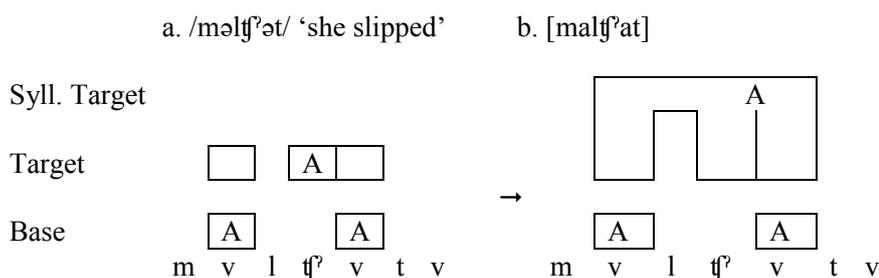
Crucial to the analysis is the assumption that if the nucleus already has a target, then it will not inherit the syllabic target. Thus in (21), the syllable target is provided by the ejective, but the vowel already has a target of its own, and inheritance is blocked.

(21) Local targets block inheritance



In order to model consonant-induced harmony, one must assume that like targetless nuclei, targetless syllables are dispreferred. Thus, if a syllable with an empty target position is followed by one which has a full target position, the two consecutive positions will be merged. This is represented in (22) for the underlying /mɔltʃʔət/ ‘she slipped’, realized as [mɔltʃʔat]. Once syllable targets are computed and harmony/merger is applied, the vowel following the ejective inherits its target, and so does any preceding vowel with no target of its own.

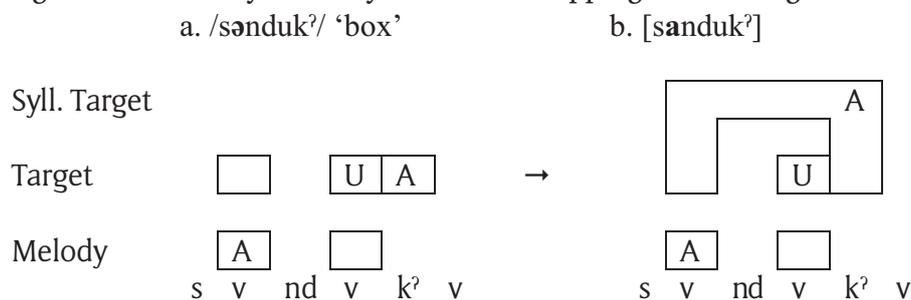
(22) Regressive harmony at the syllabic level



Consonant-induced harmony *must* operate on the syllable target level and not on the segment target level. This is not an assumption of the analysis but rather follows from the data: if it were not so, there would be no reason for the rightwards-spreading harmony to stop after one nucleus, and no reason for the lack of interaction between low vowels and non-low consonants. Once this is accepted, as Lowenstamm & Prunet (1988) claim, there is never any progressive harmony in Tigre, only regressive harmony on two distinct levels.

Now consider the case in (23) of a vocalic expression with a specified vocalic target preceding a syllable with an ejective onset. This final syllable has its target |A| determined by its onset /k<sup>ʔ</sup>/. This target spreads leftwards. The vowel of the preceding syllable already has a target and thus is not affected. But the preceding vowel only has a base melody, and therefore it inherits the target of its syllable.<sup>8</sup>

(23) Regressive harmony at the syllabic level skipping intervening consonants



It is crucial for the analysis that *vocalic targets do not become syllabic targets*. If they did, we would expect the regressive consonant-induced harmony to be blocked by intervening vowels with a target, wrongly predicting \*[sənduk<sup>ʔ</sup>]. Admittedly, that the targets of vowels do not become the target of the syllable is at the very least strange. That said, corroborating evidence comes from the simple fact that vowel-induced harmony is blocked by other vowels with acoustic targets, as in (19) above. If the targets of vowels were like the targets of consonants, we would wrongly predict \*[dabe:la] ‘he-goat’ for /dəbe:la/.<sup>9</sup>

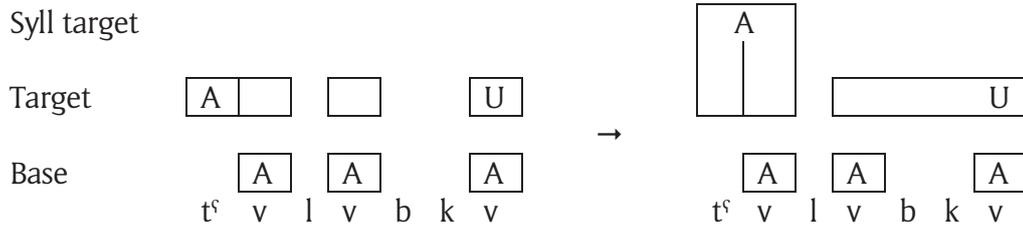
Finally, for completeness let us return to harmony in rounding. We have seen that this optional process is blocked by harmony in lowness. The representation in (24) depicts the case discussed in section 2, wherein a short low vowel is lowered locally by its onset. As a consequence, its target position is not susceptible to harmonic merger with the target of the following vowel:<sup>10</sup>

<sup>8</sup> A reviewer points out that if nuclei inherit syllabic targets, the final empty nucleus in (23) is expected to inherit the |A| originating in the ejective. Indeed it seems that inheritance is blocked if a position is otherwise empty: ejectives can also be word internal “codas”, which in Tigre are best understood as preceding empty nuclei.

<sup>9</sup> It is interesting to note in the present context cases like /məhləw/ ‘they swore’, realized [məhləw]. Here, one sees the effect of the lowering consonant [h] even though it is in internal “coda” position. This fact speaks in favor of the position prevalent in Government Phonology (Kaye et al. 1990) according to which there are no codas in Semitic. Under this view, /h/ is an onset with contributes a head |A| to its syllable, thereby being able to influence the preceding /ə/. As far as I understand, Lowenstamm & Prunet’s (1988) model in (19) has a coda and thus predicts wrongly for this form.

<sup>10</sup> A reviewer notes that the analysis in (24) might require an ordering of processes: the target of the nucleus is first determined by inheritance, and if the position is still empty, it can be filled by spreading from a following vowel. This ordering (or preference) is consistent with (23), as well.

(24) Inheritance of syllabic target blocks optional rounding harmony  
 a. /tʰələbko/ ‘I ordered (restaurant)’    b. [tʰaləbko]

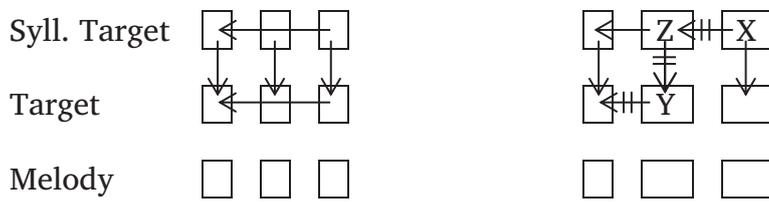


In this respect it is also interesting to comment on (23), where the same blocking holds *non*-locally: syllable-based harmony applies through /u/ and blocks the spread of the |U| target leftwards. Indeed, the speaker I worked with rejected the form \*[sondukʰ].

Let us summarize the analysis of the Tigre data. We have seen that the templates of both vowels and syllables have target positions, “heads” in the traditional terminology. While vowels and syllables with no element in the target position do exist, this is a scenario that the system seeks to avoid: targetless syllables will inherit the target of the following syllable, and targetless vowels will inherit the target of their syllable, or if the latter has no target, then that of the following vowel. Targetful vowels will not only be immune to harmony, but also block it when it comes from another vowel; they will not block it when it comes from another syllable.

The harmonic relations are summarized in (25). This diagram further emphasizes an interesting aspect of the analysis, namely the existence of a *perfect parallel between the regressive, horizontal harmony and perpendicular, syllable-to-vowel harmony*: on both levels, there is both inheritance and blocking by the same entities. On both levels, slots in the template seek to be filled; on both levels, template satisfaction is from right to left and from the top down; and on both levels, once a slot is occupied, it blocks satisfaction by inheritance.

(25) Summary of harmonic relations and blocking scenarios  
 a. possible harmonies    b. blocking scenarios



By way of additional summary, let us repeat the questions raised for these data, together with the answers provided here:

- (26) Questions and answers
- Q1. Why is the short low vowel the only undergoer of harmony?  
Because targetless expressions seek to have a target.
- Q2. How do stable vowels block vowel-induced harmony in lowness?  
By having a target themselves.
- Q3. How do pharyngeal and ejective consonants block regressive harmony in rounding?  
By endowing the targetless nucleus with a target through syllable-based Target-sharing.
- Q4: Why is vowel-induced harmony blocked by stable vowels, but consonant-induced harmony isn't?  
Because the two harmonies operate on different levels.

The next section concludes the paper.

#### 4 Conclusions

In the context of the present volume on headedness in phonological theory, the discussion of Tigre harmonies involved three claims. The first, least innovative claim is the correlation between headedness and defectiveness: headlessness is something that the grammar seeks to avoid (a similar proposal is made in Pöchtrager (2010) in an account of Turkish harmony). Headless vocalic expressions are in this sense “needy”, a term first proposed by Nevins (2010), and further adopted in a unary analysis in van Oostendorp (2014).

A slightly more innovative claim concerned the nature of the head of a phonological expression. I proposed that the logic of vocalic expressions is templatic, meaning that “head” and “dependent” are positions. As a result, head or dependent status is never inherent to an element within an expression, and therefore, the same element may appear in both the dependent and the head position of the same expression. The templatic view of vocalic expressions allowed for an account of the Tigre facts which construes harmony as fusion of adjacent templatic positions.

That said, if one claims that the same element can be in both positions, the prediction is made that some languages will distinguish between all three options in (27). Tigre, as we have seen, does not do so: it distinguishes only between (27a, b) on the one hand and (27c) on the other.

- (27) Three possibilities
- |        |    |    |    |
|--------|----|----|----|
|        | a. | b. | c. |
| Target | A  |    | A  |
| Base   |    | A  | A  |

One way of resolving the issue is to eliminate the difference between (27a) and (27c), for instance by having some principle banning expressions with a target but without a base (maybe by further extending the perpendicular inheritance in (26) to apply from target to

base). In the present short paper I have only pointed out the possibility of (27c), which is not found in the literature. It is left for future studies to see whether any further empirical content can be molded into a three-way distinction such as the one in (27).

Finally, the most innovative aspect of the present analysis is the positing of a “Target” slot at the syllabic level (though the origins of the proposal can already be found in Lowenstamm & Prunet 1988). Syllables, it was claimed, also have a “head” position, which originates in their onset. In Tigre, these positions undergo the same process of merger as the target positions of vocalic expressions. Moreover, the syllabic target interacts with the vocalic target perpendicularly just like two horizontal targets interact. In other words, syllables also have heads, which are demonstrably distinct from the heads of their nuclei, with which they interact. Since the syllable is a crucial level in the analysis, the present analysis runs against Scheer’s (2013) endeavor of the “deforestation” of phonology. It remains to be seen whether the Tigre data and data like them can be accounted for in non-arborescent theories of phonology.

### Abbreviations

F = feminine, IMPV = imperfective, IMP = imperative, M = masculine, PL = plural, SG = singular

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### Competing Interests

The author has no competing interests to declare.

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